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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/594,478	09/28/2006	Gerd Rosel	078857.0422 (2003P19408WO	9504

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EXAMINER	
BOGUE, JESSE SAMUEL	
ART UNIT	PAPER NUMBER
3748	

NOTIFICATION DATE	DELIVERY MODE
06/24/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/594,478	ROSEL ET AL.	
	Examiner	Art Unit	
	JESSE BOGUE	3748	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 September 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *11-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *11-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 September 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *09/28/2006, 06/05/2009*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 11,12,14-18,20-22 are rejected under 35 U.S.C. 102(b) as being anticipated by US Publication 2004/0006973 to *Makki et al.*

As to **claim 11**, *Makki* discloses a method for controlling an internal combustion engine having an intake tract (38), an exhaust tract (40) incorporating a three-way catalytic converter (52), and a cylinder (Fig 1) connected to the intake tract via a gas inlet valve (42) and connected to the exhaust tract via a gas outlet valve (44), an injection valve that meters-in fuel to the cylinder (50, Par 0018), and a post-cat oxygen sensor (64) disposed in the exhaust tract downstream of the three-way catalytic converter, comprising: determining a mass of fuel supplied to the cylinder as a function of a load variable (Par 0026, Par 0018); measuring a post-catalytic converter exhaust gas by the post-cat oxygen sensor (Par 0007, Line 3-5); generating a post-cat oxygen sensor measurement signal (Par 0007, Line 3-5); comparing the post-cat oxygen

sensor measurement signal with a characteristic post-cat oxygen sensor measurement signal (Par 0030, Par 0045, Fig 5); determining if the generated post-cat oxygen sensor measurement signal is representative of the characteristic post-cat oxygen sensor measurement signal based on the comparison (Par 0038-0042); determining an individual mass of fuel metered-in to the cylinder: as a function of a gradient of the post-cat oxygen sensor measurement signal or as a function of a minimum value of the post-cat oxygen sensor (Par 0040) measurement signal wherein the post-cat oxygen sensor measurement signal represents a predefined residual oxygen component if the generated post-cat oxygen sensor measurement signal is determined to be representative of the characteristic post-cat oxygen sensor measurement signal (Par 0038-0042); determining a corrected mass of fuel supplied (Par 0042, Par 0046-0048) as a function of the mass of fuel supplied, and the individual mass of fuel metered-in if the generated post-cat oxygen sensor measurement signal is determined to be representative of the characteristic post-cat oxygen sensor measurement signal (Par 0038-0042); and generating an actuating signal that controls the injection valve as a function of the corrected mass of fuel supplied (58, 50, Par 0018; Par 0038-0042).

As to **claim 12**, *Makki* discloses how the individual mass of fuel metered-in to the cylinder is determined if the post-cat oxygen sensor measurement signal is below a predefined first threshold (Par 0040).

As to **claim 14**, *Makki* discloses the individual mass of fuel metered-in to the cylinder is determined as a function of an estimated value of the current oxygen storage capacity of the three-way catalytic converter (Par 0028, Par 0031).

As to **claim 15**, *Makki* discloses how the internal combustion engine comprises a plurality of cylinders (Par 0016, Lines 1-2).

As to **claim 16**, *Makki* discloses how the corrected mass of fuel supplied is determined as a function of the mass of fuel supplied and the individual mass of fuel metered-in (Par 0038-0042).

As to **claim 17**, *Makki* discloses a method for controlling an internal combustion engine having an intake tract (38), an exhaust tract (40) incorporating a three-way catalytic converter (52), and at least one cylinder (Fig 1) connected to the intake tract via a gas inlet valve (42) and connected to the exhaust tract via a gas outlet valve (44), an injection valve that meters-in fuel to the relevant cylinder (50, Par 0018), and a post-cat oxygen sensor (64) disposed in the exhaust tract downstream of the three-way catalytic converter, comprising: determining a mass of fuel supplied to the relevant cylinder as a function of a load variable (Par 0026, Par 0018); determining if a measurement signal of the post-cat oxygen sensor is characteristic of a post-cat oxygen sensor measurement signal response (Par 0007, Lines 3-5, Par 0030, Par 0045, Fig 5); determining an individual mass of fuel reduced as a function of a post-cat oxygen sensor measurement signal gradient or as a function of a maximum value of the

post-cat oxygen sensor measurement signal (Par 0038) if the post-cat oxygen sensor measurement signal is determined to be characteristic of a predefined residual fuel component; determining a corrected mass of fuel supplied as a function of the mass of fuel supplied (Par 0038-0042) and, if the post-cat oxygen sensor measurement signal is determined to be characteristic of a predefined post-cat oxygen sensor measurement signal response, the individual mass of fuel to be reduced (Par 0038-0042); and generating an actuation signal that controls the injection valve as a function of the corrected mass of fuel supplied (58, 50, Par 0018; Par 0038-0042).

As to **claim 18**, *Makki* discloses how the individual mass of fuel reduced is determined if the post-cat oxygen sensor measurement signal exceeds a predefined second threshold value (Par 0038).

As to **claim 20**, *Makki* discloses the individual mass of fuel metered-in to the cylinder is determined as a function of an estimated value of the current oxygen storage capacity of the three-way catalytic converter (Par 0028, Par 0031).

As to **claim 21**, *Makki* discloses system for controlling an internal combustion engine having an intake tract (38), an exhaust tract (40) incorporating a three-way catalytic converter (52), and a cylinder (Fig 1) connected to the intake tract via a gas inlet valve (42) and connected to the exhaust tract via a gas outlet valve (44), an injection valve that meters-in fuel to the cylinder (50, Par 0018) comprising: a post-cat oxygen sensor (64) arranged

in the exhaust tract downstream of the three-way catalytic converter that generates a post-cat oxygen sensor signal (Par 0007, Line 3-5) representative of a residual oxygen component of a post-cat exhaust gas of the engine; and a controller (58) that: determines a mass of fuel to be supplied to the associated cylinder as a function of a load variable (Par 0026, Par 0018), measures a post-catalytic converter exhaust gas by the post-cat oxygen sensor (Par 0007, Line 3-5), generates a post-cat oxygen sensor measurement signal (Par 0007, Line 3-5), compares the post-cat oxygen sensor measurement signal with a characteristic post-cat oxygen sensor measurement signal (Par 0030, Par 0045, Fig 5), determines if the generated post-cat oxygen sensor measurement signal is representative of the characteristic post-cat oxygen sensor measurement signal based on the comparison (Par 0038-0042), determines an individual mass of fuel metered-in to the cylinder: as a function of a gradient of the post-cat oxygen sensor measurement signal, or as a function of a minimum value of the post-cat oxygen sensor (Par 0040) measurement signal wherein the post-cat oxygen sensor measurement signal represents a predefined residual oxygen component if the generated post-cat oxygen sensor measurement signal is determined to be representative of the characteristic post-cat oxygen sensor measurement signal (Par 0038-0042), determines a corrected mass of fuel supplied as a function of the mass of fuel supplied (Par 0042, Par 0046-0048), and the individual mass of fuel metered-in if the generated post-cat oxygen sensor measurement signal is determined to be representative of the

characteristic post-cat oxygen sensor measurement signal (Par 0038-0042), and generates an actuating signal that controls the injection valve as a function of the corrected mass of fuel supplied (58, 50, Par 0018; Par 0038-0042).

As to **claim 22**, *Makki* discloses how the corrected mass of fuel supplied is determined as a function of the mass of fuel supplied and the individual mass of fuel metered-in (Par 0038-0042).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Publication 2004/0006973 to *Makki et al.* as applied to claim 11 above in view of US Patent 5901552 to *Schnaibel et al.*

As to **claim 13**, *Makki* discloses how the individual mass of fuel metered-in to the cylinder is predefined to maintain the oxygen storable in the three-way catalytic converter such that the oxygen sensor downstream remains in its linear operating range (Par 0031, 0034).

Makki does not expressly disclose how the optimum oxygen storable amount in the three-way catalytic converter is approximately 50%.

Schnaibel discloses how the individual mass of fuel metered-in to the cylinder is such that approximately 50% of the oxygen storable in the three-way catalytic converter remains on the three-way catalytic converter (Col 4, Lines 1-8).

At the time of invention, it would have been obvious to one of ordinary skill in the art to modify *Makki* such that the individual mass of fuel metered-in to the cylinder is such that approximately 50% of the oxygen storable in the three-way catalytic converter remains on the three-way catalytic converter as taught in *Schnaibel* because this would allow the catalyst to operate at an optimal efficiency while allowing the downstream oxygen sensor to detect its oxygen fill level in the sensor's linear range.

6. Claims 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Publication 2004/0006973 to *Makki et al.* as applied to claim 17 above in view of US Patent 5901552 to *Schnaibel et al.*

As to **claim 19**, *Makki* discloses how the individual mass of fuel metered-in to the cylinder is predefined to maintain the oxygen storable in the three-way catalytic converter such that the oxygen sensor downstream remains in its linear operating range (Par 0031, 0034).

Makki does not expressly disclose how the optimum oxygen storable amount in the three-way catalytic converter is approximately 50%.

Schnaibel discloses how the individual mass of fuel metered-in to the cylinder is such that approximately 50% of the oxygen storable in the three-way catalytic converter remains on the three-way catalytic converter (Col 4, Lines 1-8).

At the time of invention, it would have been obvious to one of ordinary skill in the art to modify *Makki* such that the individual mass of fuel metered-in to the cylinder is such that approximately 50% of the oxygen storable in the three-way catalytic converter remains on the three-way catalytic converter as taught in *Schnaibel* because this would allow the catalyst to operate at an optimal efficiency while allowing the downstream oxygen sensor to detect its oxygen fill level in the sensor's linear range.

Conclusion

7. Additional references not cited above are incorporated here: US patent 5359852 to Curran et al: A system designed to use a feedback loop utilizing a oxygen sensor downstream of a catalyst to regulate the increase and decrease fuel to maintain catalyst oxygen fill level in the linear range.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JESSE BOGUE whose telephone number is (571)270-1406. The examiner can normally be reached on M-F 8:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Denion can be reached on 571-272-4859. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JB/
Examiner, Art Unit 3748

/Thomas E. Denion/
Supervisory Patent Examiner, Art Unit 3748